Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of the Commission's	)	MM Docket No. 00-39
Rules and Policies	)	
Affecting the Conversion	)	
To Digital Television	)	
	)	

REPLY COMMENTS OF NXTWAVE COMMUNICATIONS, INC.

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EXECUTIVE SUMMARY

Consideration of a non-compatible DTV standard is completely unwarranted as a technical matter and would unnecessarily delay by years the introduction of new and beneficial services to the American public. As NxtWave and others show in the comments submitted in this proceeding, the DTV standard is fully capable of providing reliable reception to consumers.

We fully support the reception testing of the FCC staff as a means to demonstrate the improvements that already have been made in a short year, and we will continue to cooperate with the Commission and responsible industry groups. The Commission should reaffirm its findings when it denied the original Sinclair petition and continue to insist that the digital transition proceed without the delay inherent in giving consideration to non-compatible standards of any kind.

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NxtWave Communications, Inc. ("NxtWave") submits these reply comments pursuant to Section 1.415 of the Commission's rules[1] in response to the issues and comments thereon raised in the above-captioned proceeding.[2]

I. INTRODUCTION AND STATEMENT OF INTEREST

In its comments in this proceeding, NxtWave noted that it has studied and tested the DTV standard in detail, and concluded that it meets and exceeds the Commission's goals in terms of coverage, data rate, and extensibility for new applications. It concluded that improvements in receiver design arriving in consumer markets in the coming months from multiple competing vendors would ensure robust, reliable reception.

NxtWave is a communications technology company that specializes in designing and marketing superior performing integrated circuits ("IC") chips for digital television.

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1 *Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television,* Notice of Proposed Rulemaking in MM Docket No. 00-39, 15 FCC Rcd 5257 (2000) ("NPRM").

2 47 C.F.R. § 1.415 (1999).

Our chips are used to decode broadcast and cable signals in digital devices, including integrated digital television sets; broadcast, cable and satellite set-top boxes; personal computers; and similar devices. NxtWave's current and future chips receive and decode both ATSC digital broadcast signals and 64/256 QAM digital cable signals. NxtWave will market COFDM chips for countries that have selected the European standard. In the appendix to its comments, NxtWave submitted the most recent papers authored by its staff addressing technical issues related to the vestigial sideband (VSB) technology utilized by the DTV standard.

The expertise of the NxtWave staff, coupled with its hands-on practical experience designing and testing one of the industry's best performing chips, uniquely qualifies it to comment on the VSB reception issues raised by the Commission in this proceeding and the COFDM issues raised by several commenters in response.

II. DISCUSSION

A. The Commission Correctly Declined to Consider A New, Non-compatible DTV Standard

Just four months ago, in February, 2000, the Commission denied a petition filed by Sinclair Broadcast Group ("Sinclair") requesting that the Commission authorize broadcasters to transmit DTV signals using a type of modulation that is not backward compatible with the authorized DTV standard. Nevertheless, in its comments in this proceeding, Sinclair repeats its earlier request that the Commission initiate a rulemaking to adopt an alternative, non-compatible COFDM standard.[3]

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[3] Sinclair Comments at i, 25.

In denying Sinclair's petition, the Commission relied upon numerous studies finding that analog NTSC replication is attainable using the 8-VSB standard. The Commission correctly concluded that the concerns raised by Sinclair merely demonstrated a shortcoming of early DTV receivers, and that manufacturers are working aggressively to resolve multipath problems that hinder indoor reception at some locations. The Commission also noted that its expert Office of Engineering and Technology had analyzed the relative merits of the DTV standard and Sinclair's proposed technology, and concluded that any benefits of changing the DTV transmission standard are outweighed by the costs of making such a revision; and that allowing incompatible standards could cause consumers and licensees to postpone purchasing DTV equipment and lead to significant delay in implementation and provision of DTV services to the public.[4]

B. The Expected Digital Receiver Improvements Have Been Developed and Demonstrated

Before the Commission in this proceeding are issues related to the current status of the existing DTV standard, not issues related to changing it. The Commission appropriately requested comment on progress being made to improve indoor DTV reception under the existing standard, and on manufacturers' efforts to implement DTV design or chip improvements. Related to these issues, the Commission requested information on additional studies regarding NTSC replication.[5]

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[4] Letter from Magalie Roman Salas, Secretary, Federal Communications Commission, by direction of the Commission, to Martin R. Leader, Fisher, Wayland, Cooper, Leader & Zaragoza, L.L.P. (Feb. 4, 2000); *See also*, News Release dated Feb. 4, 2000.

[5] NPRM, *supra* note 1 at ¶ 12.

The improvements expected by the Commission have indeed been attained, as we set out in some detail in our comments. NxtWave recognized the multipath signal issue early in 1998, when only demonstration station WHD in Washington, D.C., was on the air. We also recognized that these issues did not implicate the DTV standard *per se*, but rather, were problems that could be solved in the receivers and thereby maintain the advantages of the DTV standard compared to alternatives.

Through hard work, NxtWave continues to be in the forefront of DTV reception technology with its VSB demodulator chip designs. Our first chips are now entering the marketplace in consumer equipment, and our future chips will provide even better reception capability in areas of difficult signal reception. Most of our competitors also have improved their chips, but we are racing to maintain our lead. Even so, it must be emphasized that our first generation chip decodes the signals without difficulty in the vast majority of locations.

In our comments, we defined with specificity the degree of improvement to reception enabled by our new chip designs that will be in consumer devices in 2001, including specifications related to indoor reception. Our facts are supported with specific technical detail from the results of simulated tests using software that historically has been exceedingly accurate for our chip design.[6] These results show improved multipath performance, and NxtWave noted that these improvements in part are due to the benefit of data collected from field test work that became possible only in November, 1998,

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[6] *See* Comments of NxtWave at 6-11 (May 17, 2000).

when multiple digital broadcast signals first went on the air pursuant to the Commission's rules.[7] This is a scientific process.

NxtWave emphasized that the DTV standard adopted by the Commission, based on the ATSC standard, meets and exceeds the industry's original goals in terms of coverage, data rate, and ability to co-exist with existing analog NTSC signals. NxtWave appended to its comments technical papers authored by its employees over the past year addressing various aspects of the VSB demodulation technology. We also are cooperating with the Commission's DTV reception testing program, and have provided to the FCC staff equipment using our first generation chip for its own reception tests.

After analyzing hundreds of difficult-to-receive signals, we can say with confidence that based on our experience there is almost NO multipath or other difficult environment that is beyond the reception capabilities of the DTV standard. Other chip designers are also working overtime to make sure that receivers decode the ATSC signals in every environment.

While we have not commented before on broadcaster implementation of DTV, having considered the comments and having substantial experience with testing actual signals in the field, it should be noted that the facilities used for digital transmission by many digital broadcast stations are at relatively low power levels and low antenna heights that are less than the full facilities authorized by the Commission in its DTV Table of Allotments. As the laws of physics dictate, these factors impair reception and impeach casual observations that the digital signal is not receivable when a degraded analog signal may be viewable.

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[7] *Id.* at 6.

In this proceeding many broadcasters argue that they should be permitted to continue to operate indefinitely at low power and/or low antenna height. It is important to emphasize that the Commission's DTV Table of Allotments is designed to replicate the service area of the analog NTSC signal, but obviously DTV signals will not replicate the analog until and unless they are transmitted with full facilities as authorized by the Commission in its Table of Allotments. The Commission must appropriately discount claims based upon reception of digital stations that use relatively low power and low antennas that incorrectly conclude that the digital signal is less robust than the analog signal.

C. More High Resolution Programming and Lower Cost Receivers Will Drive the Digital Broadcast Transition

More high resolution programming on the digital signals is necessary for consumers to have the incentive to purchase the new digital receivers. Just as a critical quantity and quality of nightly color programming was necessary to promote the sale of color sets, digital and high definition programming will promote the sale of digital receivers. For digital, because the new system is incompatible with the old and there is only eight years provided by Congress for the transition, it is all the more urgent that suitable quantity and quality digital programming be broadcast. It is essential that an adequate variety of digital high resolution programs be broadcast. Digital transmission cannot add video resolution that is absent from its source. At a minimum, programming should not be converted from analog to digital in a manner that degrades the digital resolution due to artifacts introduced in the conversion.

Receiver pricing also must be reasonable for market penetration. We note that receiver prices have decreased much more quickly than predicted. Prices have declined

from the original $5000-8000 for a new complete set, to as low as $2500. In addition, a variety of set-top boxes incorporating reception capabilities for both satellite and terrestrial over-the-air signals in the $600 price range have appeared. Cards for personal computers that will enable digital over-the-air reception already are on the market at even lower prices. This competition to get receiving equipment into consumer hands at substantially reduced prices is a success story for DTV, and puts to rest the unfounded claims that some attempted to purvey just a few short months ago that the most economical digital TV set would cost upwards of $5000.

III. MANY COMMENTERS, INCLUDING CONSUMER GROUPS, EXPRESS SUPPORT FOR THE DTV STANDARD; ATTACKS ARE MISPLACED

We note with interest that in addition to manufacturers, most of which design both VSB and COFDM equipment, many commenters representing consumers are strong proponents of the DTV standard. These consumer representatives understand that the substantial delay that would be necessary to implement a COFDM-based standard would not be of benefit to them. The Communications Workers of America (CWA), National Consumer League, National Council of Senior Citizens, International Brotherhood of Electrical Workers (IBEW), and the Veterans' Rights Coalition all argue in favor of implementing the DTV standard without delay.

The perils of delay expressed by consumer groups would be felt most immediately by consumers who would be denied access to the service, and by those companies who have made substantial investment in the DTV standard in reliance upon its adoption. For example, iBlast – with which broadcast groups including Tribune, Gannett, Cox and the Washington Post are associated – reiterates that the DTV standard is viable and that delay would be a detriment to innovators and consumers. iBlast goes

on to state that any change to the DTV standard would delay DTV implementation by necessitating extensive study and debate of the many engineering issues surrounding system implementation, receiver design, and channel allotments.[8]

One commentor, Sinclair, continues to vilify all who do not share their point of view – including NxtWave, other chip and equipment manufacturers, industry trade groups, standards committees, and the Commission itself - is unwarranted and serves only to accent their desperation for reasons to delay that are unrelated to the technical merits of the DTV standard. Those involved in the DTV industry know that NxtWave's doors have been open wide to all who are genuinely interested in understanding the physics of terrestrial broadcasting and why VSB is the best solution for the United States. Those visiting our facility include pro-COFDM and pro-ATSC contingents alike. Visitors have come from trade groups, standards committees, broadcasters, component manufacturers, consumer electronics interests, software developers, and the Commission.

Many others have observed our demonstration of live, over-the-air reception of ATSC signals in Las Vegas, Nevada, at both the Consumer Electronics Show (CES) and National Association of Broadcasters (NAB) conventions earlier this year. We have engaged in constructive exchanges of accurate technical information with everyone who has visited, including those who do not share our viewpoint. We participate in those industry studies and tests that are scientifically addressing DTV-related issues. We also participate in proceedings of the FCC such as this one including the Commission's field testing program. We have done all this at our own risk and expense. In the process, we

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[8] iBlast Comments at 1-2.

have disclosed NxtWave's proprietary intellectual property to parties whose own products would benefit from that knowledge.

Our dialogue has been open, constructive, and collaborative with all parties except one. Only Sinclair has attacked instead of engaging in a dialogue on the scientific facts and issues. We just do not understand Sinclair's unbridled hostility and combativeness toward all who favor solid science.

IV. ATSC IS EXTENSIBLE AND WILL ACCOMMODATE FUTURE DEMANDS WHILE MAINTAINING ITS ADVANTAGES OF LOW POWER, HIGH DATA RATE, DIGITAL CABLE COMPATIBILITY, AND COMPATABILITY WITH ANALOG SIGNALS

NxtWave's NXT2000, which is considered a second-generation receiver chip although it is our first-generation, is acknowledged throughout the industry as a significant improvement over early designs. The data being collected in the field today is the basis for designing our future chips. Every generation of VSB chips in the evolution of the technology will provide breakthroughs as environmental obstacles are recognized and tackled, until the ultimate potential of the technology is achieved. The next generation of VSB chips in 2001 will once again leapfrog their predecessors.

In our comments we addressed the ability of the DTV standard to accommodate new, future uses and services. Development of a two-tiered ATSC extension, if implemented, would multiplex more robust data packets with standard packets to enable more robust reception, including portable and mobile applications. Unlike the DVB COFDM standard, implementing improvements within the ATSC standard would have two crucial benefits:

- full backward compatibility with all existing equipment; and
- no impairment to the carrier-to-noise ratio necessary to continue receiving the higher data rate transmission.

The marketplace has provided substantial incentives to solve early reception difficulties and multiple vendors, including NxtWave, have responded. Most industry participants have invested substantial resources that result in significantly improved DTV chips, tuners, and receivers. The addition of the new capabilities designed in this process will enable broadcasters to take advantage of the greater flexibility to provide an array of new services, when they are defined.

The DTV standard was designed to operate optimally in the interference-limited environment that exists during the transition period. It is apparent that the DTV standard has the advantages of high data capacity, efficient power use, designed compatibility with other signals, and compatible cable carriage.

In addition, the research undertaken in the industry's development of the current generation of VSB chips for the fixed high data rate standard has given the industry the keys to unlocking the potential for standards-compatible, hierarchical VSB in the future. However, at present there is no defined application and no technical specification for an hierarchical and robust transmission standard. Task forces assembled by the member companies of the ATSC are addressing this issue. Should a requirement be decided upon, the DTV standard has the flexibility to meet the need.

Any further delay in the deployment of digital television will only benefit those broadcasters who have no plans for digital broadcasting, no programming, and no capital funds for deployment. Such delay would come at the expense of those who have invested

in new transmission facilities, digital equipment, and programming. More importantly, American consumers will be needlessly denied access to the wide range of digital services facilitated by the transition.

V. CONCLUSION

Consideration of a non-compatible DTV standard is completely unwarranted as a technical matter and would unnecessarily delay by years the introduction of new and beneficial services to the American public. As NxtWave and others show in the comments submitted in this proceeding, the DTV standard is fully capable of providing reliable reception to consumers. We fully support the reception testing of the FCC staff as a means to demonstrate the improvements that already have been made in a short year, and we will continue to cooperate with the Commission and responsible industry groups. The Commission should reaffirm its findings when it denied the original Sinclair petition and continue to insist that the digital transition proceed without the delay inherent in giving consideration to non-compatible standards of any kind.

Respectfully submitted,

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